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The effects of 6-hydroxydopamine on the electrical characteristics of snail neurons in long-term sensitization

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Abstract

The effects of the neurotoxin 6-hydroxydopamine on the formation of long-term sensitization and changes in the membrane characteristics of identified neurons were studied. Injections of the neurotoxin 6-hydroxydopamine blocked the acquisition of long-term sensitization; when neurotoxin injections were given after the formation of long-term sensitization, they had no subsequent effect on conduction parameters. At the cellular level, recording of the electrical characteristics of common snail defensive behavior command neurons (LPa3, RPa3, LPa2, and RPa2) showed that the effects of 6-hydroxydopamine consisted of a small depolarization shift in the membrane potential and a change in the action potential generation threshold. Formation of long-term sensitization after injections of 6-hydroxydopamine did not lead to further decreases in the membrane and threshold potentials of command neurons as compared with snails only given injections of 6-hydroxydopamine. The changes in electrical measures of command neurons induced by administration of the neurotoxin 6-hydroxydopamine lasted at least two weeks.

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Keywords

6-hydroxydopamine, Dopamine, Long-term sensitization, Membrane potential, Plasticity, Threshold potential